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Indian Standard

GLOSSARY OF TERMS RELATING TO COMMERCIAL EXPLOSIVES, PYROTECHNICS AND BLASTING PRACTICES

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Indian Standard

GLOSSARY OF

TERMS RELATING TO COMMERCIAL EXPLOSIVES, PYROTECHNICS AND BLASTING PRACTICES

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Indian Standard

GLOSSARY OF

TERMS RELATING TO COMMERCIAL EXPLOSIVES, PYROTECHNICS AND BLASTING PRACTICES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 31 December 1981, after the draft finalized by the Explosives and Pyrotechnics Sectional Committee had been approved by the Chemical Division Council.

0.2 The Explosives and Pyrotechnics Sectional Committee felt the necessity for a comprehensive list of terms used in commercial explosive and pyrotechnic industry and their precise and commonly agreed definitions in order to avoid ambiguity and confusion to manufacturers and consumers. It is expected that this standard would eliminate ambiguity in the interpretation of terms used in trade and industry.

0.3 Indian Standards for various explosives and their accessories have been formulated. This standard is being issued as an adjunct to these standards.

1. SCOPE

1.1 This standard covers the terms and definitions that are prevalent in commercial explosives, pyrotechnics and blasting practices.

2. TERMS AND DEFINITIONS

A

Abel Heat Test — British official heat test which is generally applied to nitro-explosives. The principle of the test is to note the time required to produce a standard tint on a potassium iodide-starch paper when the explosive is heated under specified conditions.

Acoustic Warning — A distinctive audible warning used to indicate the start of blasting operation.

Actuator, Explosive — A self-containing power transmitting device to convert chemical energy into mechanical energy. Removers (retractors), thrusters, dimple motors, etc, fall in this category.

Adiabatic Ignition — Ignition of explosives and pyrotechnic system in which there is no virtual heat transfer.

Adsorption — The adhesion in an extremely thin layer of molecules of gases or dissolved substances or of liquids to the surfaces of solid bodies with which they are in contact.

Ageing of Explosives — Changes which may include physical, chemical and/or performance of explosives due to environmental conditions.

Air-Blast — Shock wave transmitted through air.

Air Gap Sensitivity Test (Ardeer Double Cartridge, ADC Test) — A test to determine the sensitivity of a charge of a receptor explosive to initiation by the donor charge separated by an air gap in line with the donor.

Aluminium Block Expansion Test — A test similar to lead block expansion test but superior to it when testing brisance of explosives, especially those containing aluminium.

Ammunition — Explosive substances when enclosed in any case or contrivance or otherwise adopted or prepared so as to form a cartridge or charge for small arms, guns, rockets or other weapons and components thereof such as caps, detonators, primers, boosters, fuses, shells, warheads, etc.

AN-FO — An explosive based on ammonium nitrate and fuel oil.

Approved (Authorized) — When used for explosives means approved (authorized) by competent authority.

ASA — An initiatory mixture containing lead azide, lead styphnate and aluminium powder.

Available Energy — Net useful energy of explosion released for doing work.

B

Back Break — Rock broken beyond the lines of drill hole.

B & J Test (Bergman Junk Test) — A test for computing the stability of a propellant and nitro-cellulose by measuring the amount of nitrogen oxides evolved when a sample is heated at 132°C or 120°C for a prescribed period.

Ball Powder — A propellant in small and hard spherical form, generally used in small arms ammunition.

Ballistic Mortar — A type of compound pendulum consisting of a heavy mortar suspended by a rigid frame of light aluminium plates on a knife edge used for ballistic mortar test for the measurement of the power of an explosive [*see 3.11 of IS : 6609 (Part II/Sec 1)-1973**].

Ballistic Pendulum — A compound pendulum propelled by the blast of an explosive fired from a standard cannon for determining the power of an explosive.

Ballistite — A high calorimetric value double base propellant usually in the form of flakes containing around 40 percent of nitroglycerine.

Baratol — An explosive composed of barium nitrate and TNT.

Base Charge (in a Detanator) — A high explosive charge which makes the major contribution to the power of the device.

Base Charge (of a Propellant) — The principal component of the propellant charge.

Bench Blasting — A method of blasting in open cast mines with vertical holes in levels or benches (in the form of steps).

Berger (Explosive) — A blasting explosive mixture containing potassium chlorate, potassium bichromate, sugar and yellow wax in the proportions 61 : 6.1 : 27 : 5.1.

Berger Mixture — A smoke producing pyrotechnic composition based on zinc powder and chlorinated hydrocarbon.

Binary Explosives — *See ' Two-component explosives '.*

Bischel Bomb (Bischel Gauge) — An equipment used to determine the pressure of explosion and to examine the products of detonation/ explosion.

Blasjo Cut — *See under ' Cut '.*

Blast — Shock wave generated from the point of detonation which includes a shock front, a high pressure area behind the shock front and the following rarefaction.

Blasting — A process of loosening rocks, minerals, etc, by explosives.

*Methods of test for commercial blasting explosives and accessories : Part II Explosives, Section 1 Explosives, general.

Blasting Agent — Any material or mixture consisting of a fuel and oxidizer intended for blasting not otherwise classified as an explosive and in which none of the ingredients is classified as explosive, provided the finished products, mixed and packed for use or shipment, cannot be detonated by a No. 8 blasting cap when unconfined.

Blasting Cap — *See 'Detonator'.*

Blasting Gelatine — A high explosive based on nitroglycerine consisting of about 92 percent nitroglycerine and about 8 percent nitrocellulose.

Blasting Machine (Hell Boxes) — *See 'Exploder'.*

Blasting Mat — A net-like structure made of rope, wire, or any other suitable material placed over a blasting site to prevent fly rocks.

Blasting Powder (Gun Powder, Black Powder) — A low explosive incorporating sodium/potassium nitrate, charcoal with and without sulphur.

Blasting Ratio — Tonnes of rock blasted per kg of an explosive used.

Blasting Soluble Nitrocellulose (BSNC) — A type of nitrocellulose used in the manufacture of gelatinous nitroglycerine-based explosives.

Blister Shooting — *See 'Mud capping' or 'Blaster shooting'.*

Blown Shot — A shot which has not done any useful work on initiation in a blown-out shot.

Bomb — An explosive device used for producing destructive effect by launching against a target.

Booster — An intermediate high explosive charge in an 'explosive train' which is easily initiated by a detonator or detonating fuse to detonate the main explosive charge completely (same as 'Primer').

Bore Hole (Drill Hole) — A prepared hole for the insertion of explosive charge.

Bottom Charge — A charge loaded into the bottom of a drill hole.

Box Cut — *See under 'Cut'.*

Bridge Wire — A resistance wire connected across two lead wires.

Brisance — Shattering power of an explosive as distinguished from its total work capacity; it indicates its ability to shatter and fragment hard structures and is dependent upon its velocity of detonation.

Briska Detonator — A detonator in which extra strength is achieved with the same quantity of base charge by subjecting it to a much higher pressure.

Bubble Energy — Energy contained in a bubble formed on detonation of an explosive charge under water, in other words, the gas pressure energy component of the total available energy of an explosive.

Bubble Sensitization — Sensitization of an explosive charge by the adiabatic compression of entrapped gas bubbles.

Bulk Loaded Explosive — Explosive directly loaded (without a protective wrapper) into boreholes.

Bulk Power — Power per unit volume of explosive.

Bulled Hole — A bore hole with a chamber at the bottom which is formed by blasting a light charge of explosive to accommodate a large quantity of explosive (*see ' Coyote blasting '*).

Bullet Impact Test — A test to determine the extent to which various ammunitions or explosives which are packed in regulation containers are safe against the effects of small arms fire.

Bulling (Chambering) — A procedure intended to enlarge a section of a drill hole to obtain a greater concentration of explosive at that point.

Burden (Face Burden) — The distance between the main body of the charge and the nearest free face.

Burn Cut (Shatter Cut) — *See under ' Cut '.*

Burning Rate — The linear regression of reaction zone measured per unit of time. Reciprocal of burning rate is the burning time.

Bursting Time — The time from the application of energy to the bursting of the detonator.

Butt Hole (Bottlog Socket) — A portion of the borehole remaining in a face after firing of the charge.

C

Cannon (Standard Cannon) — A heavy steel device used to fire charges for testing permitted explosives [*see 3.1.3 of IS : 6609 (Part II / Sec 2)-1974**].

Cap — *See ' Detonator ', ' Blasting cap '.*

*Methods of test for commercial blasting explosives and accessories: Part II Explosives, Section 2 Explosives, permitted.

Cap Sensitive — Any explosive composition which can be efficiently initiated by a commercial No. 6 detonator.

Capped Fuse — A length of safety fuse with a plain detonator crimped onto one end.

Cartridge — A preformed unit of explosive wrapped to a predetermined diameter and length. Also a round of small arm or gun ammunition. Also a type of military pyrotechnic store.

Cast Explosives — Explosives which are melted and loaded by casting into a receptacle.

Cavity (Cavitation in Filled Explosives) — An air space within filled explosive that usually results in non-uniform burning or premature bursting.

Cavity Charge — *See ' Hollow charge '.*

Chambering — *See ' Bulking '.*

Characteristic Impedance of an Explosive — The product of density and optimum velocity of detonation of an explosive.

Charge — A given quantity of an explosive filled in an ammunition or a shot hole.

Charge Density — Quantity of explosive charge per unit length of the borehole.

Charge Flash

- a) A readily ignitable explosive charge used in ignition elements of electric primers and detonators.
- b) A pyrotechnic charge used in flash producing items such as photo-flash cartridges, bombs or spotted devices.

Charge Signal Ejection — An explosive device designed to eject a signal from an underwater mine, used for training.

Charge Weight — Weight of explosives charged.

Charging (Loading) — The act of placing the explosive in the desired position for blasting.

Chemical Ammunition — Any ammunition containing casualty agents, riot control agents and incendiaries.

Circuit — The wiring connecting electric detonator(s) to the source of power for initiating them.

Classification — The division of explosives into classes and divisions according to their general characteristics for storage and transportation.

Clay Cock (Clay Plug) — Clay plug used for stemming.

Collar — The space left on the top of the explosive charge in a bore-hole.

Collar-Priming — Priming of the main explosives column in such a way that detonation is initiated at the primer near the collar.

Column Loading — The charging of a borehole with a train of explosive.

Compatibility — The ability of a substance or a combination of substances to remain indefinitely in contact with an explosive without any adverse physical and/or chemical effects on each other.

Confined Shots — Charges fired under confined conditions.

Confinement — The degree of restraint exerted on the explosive charge by the surrounding material.

Connector for Ignitor Cord — These are used to provide a connection between the end of the safety fuse and the ignitor cord.

Continuity of Detonation (COD) — The property of an explosive to propagate detonation along the explosives column over a length of 1 m from the point of initiation.

Cordite — Double based propellant in the form of cords.

Coromunt Cut — *See* under ' Cut '.

Coyote Blasting — *See* ' Bulled hole '.

Crater — A depression in the ground caused by an explosion.

Crimper — A hand tool used for crimping a detonator onto a safety fuse.

Crimping Machine — A machine used to crimp detonators to the igniting device.

Crimping Station (Capping Station) — A special room or building used for preparing capped fuses.

Critical Diameter — The minimum diameter at which an explosive column when initiated propagates detonation over the entire column.

Crushed Zone — The zone of rock surrounding the borehole which is crushed by the blasting of an explosive charge.

Cushion Blasting — A technique of blasting using space cartridges (see also ' Perimeter blasting ', ' Smooth blasting ').

Cut — An arrangement to provide a free face at the time of blasting an explosive.

The different types of cut employed in simultaneous blasting are under-cut, middle-cut, over-cut and side-cut. These are defined as follows :

Under-Cut — provided at the floor level of the rock face.

Middle-Cut — provided in the middle portion of the rock face.

Over-Cut — provided at the roof level of the rock face.

Side-Cut — provided vertically on any side of the rock face.

The different types of cut employed in delay blasting are : drag-cut, fan-cut, wedge-cut, blasjo-cut, pyramid or diamond-cut, burn-cut and coromunt cut. These are defined as follows:

Drag-Cut — A cut in which shot holes are angled in a vertical plane.

Fan-Cut — A cut in which shot holes are angled in a horizontal plane.

Wedge-Cut — A cut in which a wedge is formed either vertically or horizontally by pairs of holes drilled at about 60° to the face and meeting or finishing close to each other at the back of the cut.

Blasjo-Cut — A wedge cut in the horizontal plane in which the pair of shot holes one on each side of the face has between them an angle of 30° , with the trimmers at the top and bottom levels of the face.

Pyramid or Diamond-Cut — A cut consisting of a group of shot holes drilled from the periphery of a core to meet at a point which forms the back of the cut.

Burn-Cut (Shatter-Cut) — A cut comprising a cluster of shot holes drilled approximately at right angles to the face and placed close to each other and parallel throughout their length, with one or more holes left empty in the vicinity of the charged holes, thus forming additional free face to relieve the burden on the charge holes.

Box-Cut — A burn-cut in the pattern of a square or rectangle with one or more empty holes interspersed.

Line-Cut — A burn-cut in the pattern of a straight line with alternate charged and uncharged holes.

Coromunt-Cut — A cut comprising a cluster of parallel shot-holes drilled approximately at right angles to the face and placed close to each other with one or more empty centre holes which are actually two holes drilled close together and slightly over-lapping each other.

Cut Off — A condition of a hole charged with explosive which has been partially sheered off by the blast of the previous shot.

Cutting Charge — A charge of explosive applied to the outside of an object with the aim of cutting or sheering it off.

D

Dead Pressed — An explosive pressed to such an extent as to lead to loss in sensitivity to detonation.

Deck Charges (Deck Loading) — Charges placed above a base charge at pre-selected intervals and which are separated from the base charge and each other by sand or other spacing materials.

Decoupling — The extent of air space left between the explosive charge and the inside wall of the borehole.

Deflagration — Brisk burning of an explosive without detonation.

DEGN (EGDN) — Abbreviation for diethylene glycol dinitrate.

Delay — A pyrotechnic item mostly of relatively slow reaction time (in mm per s), suitable for timing sequence of events (see ' train ').

Delay Detonator — A detonator which functions at a predetermined delay after the application of energy.

Delay Detonator Relays or Detonating Relays — A component of high explosive train which introduces a delay in the time of functioning of the detonating fuse.

Delay Element — A component which provides a specific delay in the detonator, fuse, etc.

Delay Interval — The interval expressed in time between initiation and detonation of the bursting charge.

Densification — To increase the density of an explosive composition.

Desensitization — Desensitization (or phlegmatization) of an explosive means rendering it insensitive or less sensitive to heat, shock, impact, percussion, rifle bullet or friction.

Detonating Cord (Detonating Fuse) — Essentially a small round core of high explosive covered with a protective sheath to propagate a detonating impulse.

Detonation — An exothermic chemical reaction in which the advancing reaction zone in the explosive column is preceded by a shock wave.

Detonation Front (Detonation Head) — The envelope produced by a shock wave detonating an explosive charge.

Detonation Pressure — Pressure exerted at the detonation front.

Detonation Trap — A device which arrests further propagation of detonation front.

Detonation Velocity — The rate of advance of the reaction zone is termed detonation velocity or rate (*see VOD*).

Detonator — A device to start an explosive process.

Detonator No. 6 — Standard detonators which when tested by sand bomb test as prescribed in IS : 6609 (Part III)-1973* give the following quantity of crushed sand:

- a) Percentage of sand passing through 500-micron IS sieve not less than 35.
- b) Percentage of sand passing through 250-micron IS sieve not more than 30.

Detonator No. 8 — Standard detonators which when tested by the sand bomb test as prescribed in IS : 6609 (Part III)-1975* give the following quantity of crushed sand :

- a) Percentage of sand passing through 500-micron IS sieve not less than 50.
- b) Percentage of sand passing through 250-micron IS sieve not more than 45.

Diamond Cut — *See under ' Cut '.*

Direct Initiation — Initiation of a column of explosive from the mouth of the borehole.

*Methods of test for commercial blasting explosives and accessories : Part III Detonators, general and permitted.

Down Line Propagation — Propagation of detonation in a column of explosive charge with the initiating device spread along the length of the explosive column down the borehole.

Drag Cut — See under 'Cut'.

Drifting — One of the methods in stoneblasting in coal mines. The principles involved are similar to those of tunnelling.

Drilling — Operation of making boreholes for leading explosive charges.

Dry Blasting Agent/Explosive — A powder explosive generally consisting of ammonium nitrate as the major ingredient with no explosive sensitizer.

Dynamite — Originally referred to nitroglycerine absorbed in kieselguhr but now extended to other high explosive compositions based on nitroglycerine.

Dynamite Gelatine — Explosives based on a gelatinized mixture of NC and NG with other additives. These are also known as gelatines or gelignites. Some gelatine NC/NG mixtures are also referred to as dynamites in continental countries.

Dynamite, I.F. F (Low Freezing) — High explosive composition based on nitroglycerine as sensitizer with other liquid explosive such as DNT, EGDN, etc, to serve for lowering freezing point of nitroglycerine.

E

Electric Detonator (Electric Cap) — A detonator having electrical means of ignition.

Electric Lighters (for Igniters) — Specially a slotted connector containing a pyrotechnic composition for attachment to igniter cord and which is initiated electrically to ignite the cord.

Electric Storm — A storm which may include an electrostatic charge.

Electro-Explosive Devices — Devices consisting of a charge of explosive in contact with an electro-explosive transducer.

Emulsion Explosive — An explosive in the form of emulsion.

Excitation Time — The minimum period of time (usually of the order of milliseconds) for which the detonator fuse-head should be subjected to the current impulse passing through the bridgewire for ignition of the fusehead.

Exploder — A device which supplies electrical energy for initiating electric detonators.

Explosion — Liberation of energy sufficiently sudden to cause dynamic stress to the surroundings.

Explosion Pressure — Pressure developed on explosion.

Explosive — A material or mixture of materials which when initiated undergoes a rapid chemical change with the development of heat and high pressure. Explosives are broadly divided into two main classes.

- a) *Low Explosive* — A class of explosives which do not detonate but rather generate a large amount of gas and heat when ignited. Normally pyrotechnics and propellants fall under this class.
- b) *High Explosives* — A class of explosives which detonate when suitably initiated and are characterised by high rate of reaction and pressure.

Explosive Column — A train of explosive charges.

Explosive Limit — A limit imposed by the statutory authority specifying the quantity of explosive that can be handled/stored or transported.

Explosive Primary — An explosive which explodes or detonates on application of small external energy produced by friction, impact, flame or heat (see 'Initiatory Explosives').

Explosive Secondary — A term applied to a few high explosives which are not as sensitive as the primary explosives but are more sensitive to initiation by the primary explosives. They are used as booster or exploder charges, for example, tetryl, PETN.

Explosive Strength — Strength of an explosive expressed as the percentage equivalent of blasting gelatine which is arbitrarily given a value of 100 percent. This definition may not be applicable for all types of explosives.

Explosive Switch — A self-contained electrically initiated small unit that causes one or more electric circuits to be opened and/or closed by explosive action.

Explosive Train — A series of explosive charges specially arranged to produce a desired outcome of detonation or explosion.

Exudation — The appearance of oily liquid on the inside or outside of an explosive.

F

Face Burden — See ' Burden '.

Fall Hammer — An equipment to assess the sensitiveness of an explosive to impact.

Fan Cut — See under ' Cut '.

Fire Damp Emission — A continuous evolution of methane (called fire damp) in coal mine workings.

Firing — The act of initiating an explosive.

Firing Cable — Insulated wires to connect the shots to be fired to the source of energy to be used.

Firing Circuit — Electrical circuits which may be in series, parallel, series-parallel or parallel-series obtained by connecting detonator lead wire in various ways.

Firing Device — See ' Exploder ', ' Mains Firing '.

Flammability — Susceptibility of a substance to ignition and sustained combustion.

Flammability Range — The difference between the minimum and maximum percentage by volume of the gas in mixture with air that forms a flammable mixture.

Flares — A pyrotechnic ammunition designed to produce a single source of intense light for relatively long durations for target or air-field illumination or for signalling and other purposes.

Flyrocks — Rocks thrown at an excessive distance from the blasting site.

Fragmentation — The extent to which the blasted material is shattered into small fragments. The size distribution of the blasted material in the muck pile after the blast.

Freezing and Thawing Test — A test in which samples of NG-based explosives are subjected to alternate freezing and storage at room temperature to see if any gel breakdown occurs.

Friction Sensitivity — Sensitivity of explosive to initiation by friction.

Frictional Impact Test (Torpedo Friction Test) — Test of explosives for sensitivity to impact and friction simultaneously.

Fume Characteristics — Characteristics (mainly toxicity) of post detonation fumes of explosives.

Fuse — A slow burning device designed to initiate an explosive system on being subjected to one of the actions such as ignition, stab, percussion or friction.

Fuse Detonating — *See ' Detonating cord '.*

Fuse Head — An electrical ignition device, without lead wires.

Fuse Ignitor — A pyrotechnic device which burns with a very hot jetting flame and is used to ensure ready ignition of safety fuse.

G

Gallery Test — A standard test for studying the safety of explosives for general application in underground coal mines.

Gap Sensitivity — *See ' Air gap sensitivity '.*

Gap Test — *See ' Air gap sensitivity test '.*

Gasless Composition — A pyrotechnic material that reacts with release of very small amount of gaseous products.

Gelatinous Explosive — An explosive consisting of gelatinized mixture of nitrocellulose and nitroglycerine and other additives.

Gerbe — A pyrotechnic device usually with 20 mm inside diameter from which a jet or spray of fire issues.

Grit Sensitivity — The sensitivity of an explosive to initiation in the presence of grit.

Gun Powder — *See ' Blasting powder ', ' Black powder '.*

H

Halved Cartridge Test — An air gap sensitivity test in which the explosive cartridge is cut into two halves to make a donor and a receptor and the cut ends face each other.

Hang Fire — A charge which fires later than intended where a deflagration stage precedes the explosion.

Heat of Explosion — The heat evolved when a substance (explosive) is exploded in the absence of oxygen.

Heat Test — *See ' Abel heat test '.*

Heave (Throw) — The extent to which the broken mass of the rock is thrown from its original location.

Hess Test — Lead block compression test for the determination of brisance of an explosive.

High Explosive HE — *See under ' Explosive '.*

Hollow Charge/Shaped Charge — A charge incorporated with a cavity to produce what is known as 'cavity effect' or ' Munroe effect '.

Hot Spots — High temperature spots produced in a layer of explosive arising out of impact, friction or adiabatic compression of entrapped gas bubbles.

I

Igniter — A cartridge or a charge with an initiating device.

Igniter Cord — A cord which burns at a faster rate than that of the safety fuse and which is used to ignite a number of safety fuses in sequence.

Igniter Cord Connectors — Slotted and recessed metal tubes containing a pyrotechnic composition which are used to connect igniter cord to safety fuse.

Illuminating Flare — A military device containing a pyrotechnic composition (usually illuminating) comprising mixtures based on finely powdered substances like aluminium and magnesium, compressed into the form of a candle.

Impact Sensitivity — Sensitivity of explosive to initiation by impact (see ' Call hammer ').

Incendiary — A substance used for destructive ignition.

Incendivity — The degree to which an explosive is prone to ignite gas mixtures or coal dust in a statutory test.

Induction Time — In firing electric detonators, the time between the breaking of the fuse wire and the detonation of the base charges.

Initiating Efficiency — Ability of an initiator, primer or booster, to reliably detonate a high explosive charge.

Initiation — To start an explosive reaction by means of a spark, heat, impact, friction or a shockwave.

Initiator — First element of an explosive or pyrotechnic train normally containing a small amount of primary explosive.

Initiatory Explosive — A primary explosive alone or in combination with other ingredients used for setting off a secondary explosive usually in a detonator system.

Instantaneous Fuse — A fuse which propagates by burning at high velocity.

Inverse Initiation — Initiation of an explosive column from the back of the borehole.

K

Kast Brisance Meter — An apparatus for measuring the Brisance by compression (crushing) of a copper cylinder.

L

Lag Time — Time interval between the application of energy to an electric detonator and the breaking of its electric circuit.

Lances — Paper tubes of light construction measuring 6 to 9 mm dia and 50 to 75 mm length filled with coloured fire composition, which is charged into the tube by temping only. These are used in set pieces, attached to a wooden framework and are meant to produce outlines of the figures of the desired pattern such as a flag, words, etc.

Lanyard — A chord or cable for setting off a firing mechanism from a distance.

Lead Block Test (Trauzl Lead Block Test) — A method of measuring the power of an explosive by the expansion caused in the cavity of a lead block after firing a charge of explosive.

Lead Plate Test — A test which is employed for testing the strength of detonators.

Lead Wires (Leg Wires) — Insulated wires permanently attached to electric detonators.

Leakage Resistance — Leakage of current due to insufficient insulation resistance of the wire leading to the shot.

Line Cut — *See* under 'Cut'.

Liquid Oxygen Explosive (LOX) — Charged prepared by soaking an absorbent cartridge made of combustible ingredients in liquid oxygen.

Liquefaction — Segregation of liquid present in the explosive including segregation of liquefiable oxidizer salts in the explosives by extraneous agencies such as moisture pick up.

Loading — Filling of blast holes with explosives.

Loading Density — Charge per unit length of borehole in mining practice.

Loading Pattern — Pattern of loading explosives into the blast holes.

Low Explosive — *See under ' Explosives '.*

Low Freeze Explosive (Polar Explosive) — A nitroglycerine based explosive incorporating a low freeze mixture of nitroglycerine and ethylene glycol dinitrate (EGDN) with or without other antifreezing ingredients.

M

Magazine — An approved store which is exclusively appropriated to the keeping of explosives.

Magazine Shoes — Shoes specially made without iron/steel in the soles and heels for wearing in magazines.

Mains Firing — Firing of explosives by energising the mains circuit from mains of electric supply.

Match — Cotton wicking impregnated with gunpowder, used for conveying fire to a piece or parts of pyrotechnical devices.

Match Fuse — A stick of match fuse safety consisting of a firm solid cigar shaped bulb of a smouldering composition or compositions formed over a layer of inert material around one end of a wooden splinter, chemically treated to merely char but not burst into flame on heating.

Mats (Blasting) — *See ' Blasting mat '.*

Methyl Violet Test — A test for stability of propellant (single based and double based) by measurement of time required for oxides of nitrogen to be evolved by thermal decomposition under specified conditions and change in the colour of methyl violet paper to bright salmon pink.

Middle Cut — *See under ' Cut '.*

Mine (Explosives) — An encased explosive or chemical charge placed in position so that it detonates when its target touches or moves near it or when it is touched by remote control.

Minimum Booster — Minimum quantity of booster required for reliable detonation of a non-cap sensitive explosive charge.

Misfire — A charge or a part of charge which for any reason fails to detonate.

Mud Capping — *See ' Plaster shooting '.*

Muffled Blasting — A method of blasting to prevent fly rocks.

Multiple Fuse Igniter — A device for igniting many lengths of safety fuse simultaneously by means of a master fuse.

Munroe Effect (Cavity Energy Effect) — The axial reinforcement of waves in a particular direction as a result of explosion.

Muzzle Burst — Explosion of a projectile near or at the muzzle of a weapon.

Muzzle Flash — Flame at the muzzle of a gun after a projectile leaves the barrel.

Muzzle Velocity — The velocity of a projectile at the muzzle end.

N

Napalm — Aluminium soap in powder form, gelatinized in gasoline for use in bombs of flame throwers.

NC — Nitrocellulose.

NCN — Nitrocarbonitrile.

NCN Blasting Agent — A blasting agent either in powder or slurry form based essentially on nitrocarbonitriles.

NG — Nitroglycerine.

Nitrous Fumes — Fumes containing various oxides of nitrogen.

Non-electric Delay Detonators — Delay detonators containing non-electric means of initiation.

Non-incendive Short Period Delay Detonators — Specially designed detonators for use in gassy and dusty coal mines.

Non-permitted Explosive — Explosives whose use is not permitted for blasting in underground gassy and dusty coal mines.

O

Obturate — To seal an explosive device to prevent explosive gas in a particular direction.

Ogive — A curved or front section of a projectile or signal.

Ordinary Detonator — *See ' Plain detonator '.*

Ordnance — Large size military guns and mortars.

Over-cut — *See under ' Cut '.*

Overdrive — High energy initiation of the explosive column.

Oxidizer — A substance that furnishes the reactant oxygen.

Oxygen Balance — Oxygen content relative to the total oxygen required for the complete oxidation of all oxidizable material.

P

PAD — Propellant actuated device formerly CAD (cartridge actuated device).

Partial Detonation — Incomplete detonation.

Pattern (of Blasting) — A dimensional plan of holes to be drilled for blasting a face.

Pentalite — Mixture of PETN and TNT.

PETN — Pentaerythritol tetranitrate.

Percussion Primer — A small capsule containing primary explosives initiated by a firing pin.

Perimeter Blasting — The firing of lightly charged perimeter holes either prior to or at the same time as the main blast (see ' Cushion blasting ', ' Smooth blasting ' and ' Pre-splitting ').

Permitted Detonator — A specially designed detonator for use in gassy and dusty coal mines.

Permitted Explosive — A specially designed explosive suitable for use in gassy and dusty coal mines, which has passed certain statutory tests.

Phlegmatization — See ' Desensitization '.

Picrite — Nitroguanidine.

Plain Detonator — A metal tube closed at one end, charged with the initiating explosive consolidated under pressure, and left open at the other end. It is intended for use with safety fuse.

Plaster Shooting — Also known as ' Secondary blasting ' and ' Mud capping '. It is a technique where explosive charges are blasted on the rock surface without drilling any holes. The charge is usually covered by mud or clay, and hence the name ' Mud capping '.

Plastic Explosive — An explosive having plastic properties which can be moulded to the desired shape.

Polar Explosive — See ' Low freeze explosives '.

Pop (Popping, Pop Shooting) — The breaking of rocks by firing a small charge within holes which have been drilled into them.

Post-detonation Fumes — Fumes generated by blasting of explosives.

Powder Explosive — Explosive in powder form.

Powderman (Powder Monkey, Shot Firer) — *See ' Shot firer '.*

Powder Van — A covered van specially designed to carry an explosive safely (also called ' Explosive van ').

Power — A measure of the amount of energy released by an explosive on detonation and hence of its ability to do useful work (same as ' Strength ', ' Weight strength ').

Power Factor — *See ' Blasting ratio '.*

Premature Explosion/Detonation — An explosion which occurs earlier than it is intended.

Primer — *See ' Booster '.*

Priming Charge — In detonator manufacture, the charge of initiating explosive.

Propellant — An explosive which by its regularity of burning produces sustained pressure in the bore of a gun for imparting acceleration to the projectile.

Pyramid Cut — *See under ' Cut '.*

Pyrotechnic — An explosive containing combustible materials for the production of flame, heat, light, smoke or sound.

R

RDX — Cyclotrimethylene trinitramine (also known as ' Cyclonite Hexogen '). The origin of the word is ' Research Department Explosive '.

Reflection Shooting — A method of seismic prospecting in which charges are fired singly or in multiples to get reflected seismic signals.

Refraction Shooting — A method of seismic prospecting in which heavy charges of explosives are fired for obtaining refracted signals.

Relays — *See ' Delay detonator relays '.*

Ripping — In coal mining, the removal of stone after recovery of coal to produce a road of normal size. The operation is commonly associated with longwall method of mining coal.

Rotational Firing (Sequence Firing) — The firing of charges in predetermined order.

S

Safety Distance

- a) *Inside (ISD)* — The distance between a building or stack containing explosives and other such building or stacks inside an enclosed explosive area which will prevent the immediate direct propagation of explosion or fire from one to the other by missile, flame or blast.
- b) *Outside (OSD)* — The distance between a building or stack containing explosives and other buildings, railways, waterways, and main roads outside an enclosed explosive area beyond which ignition or explosion of explosives or dangerous goods will not cause severe structural damage to the building, etc, or serious physical injury to persons.

Safety Fuse — A fuse for blasting which burns and does not explode and which does not contain its own means of ignition, and which is of such strength and construction and contains an explosive in such quantity that the burning of such fuse would not communicate laterally with other like fuses.

Salamander Blasting — A blasting technique used to remove salamander or solidified slag from blast furnaces.

Sand Bomb Test (Sand Test) — A test to assess the strength of a detonator in terms of crushing of sand in a closed chamber.

Secondary Blasting — A process of breaking, with explosives, boulders from an initial blast which are too large for immediate handling (see ' Blaster shooting ').

Seismic Explosives — Specially designed explosives used for seismic prospecting.

Sensitivity — Susceptibility of an explosive or pyrotechnic component to react to external stimuli.

Shaped Charges — An explosive charge designed to produce specific effects by the inclusion of a re-entrant conical or V-shape usually lined with metal.

Sheet Explosive — An explosive in the form of a sheet.

Shelf Life — Length of time in storage during which an item will remain in serviceable condition.

Shock Wave — A compression wave caused by sudden rise in pressure due to release of a large quantity of gaseous products at high temperature resulting from decomposition of the explosive material.

Short Firing — The firing of explosive charges.

Shot Delay (Detonators) — A delay detonator with functioning time of the order of milliseconds.

Shot Firer — A person who is authorized and licenced to prepare explosive charges and carry out blast operations (same as ' Powderman ', ' Powder monkey ').

Shot Firing Cables (Leads) — *See ' Firing cable '.*

Side-cut — *see under ' Cut '.*

Signal Pistol — A single shot pistol designed to project pyrotechnic signals.

Single Base Propellant — Propellant based on nitrocellulose only.

Slurry Blasting Agents (SBA) — *See ' Blasting agents '.*

Slurry Explosives (SE) — An explosive made by sensitizing a thickened slurry of oxidizing salts, fuels and other ingredients (same as ' Water gel explosives ').

Smooth Blasting — A method for firing holes in such a manner as to avoid excessive fracturing with the aim of preserving a smooth outline (*see also ' Cushion blasting ', ' Perimeter blasting '.*).

Socket — A partially blasted shot hole containing undetonated explosive.

Solid Blasting — Blasting any solid rock face when only one free face is available.

NOTE — This method is not limited only to blasting of coal but applies to all types of rocks.

Sound Signal — *See ' Acoustic warning '.*

Spacers — Non-explosive material (for example, wood, ceramic) interposed between charges to extend the column of explosives.

Spacing — The linear distance between the collars of drill holes.

Spalling — The breaking off of a scab of material from a free face as a result of the reflection of shock waves.

Spontaneous Ignition — Ignition occurring without external energy input.

Sporting Powder — Powder used for filling of cartridges with a nitrocellulose propellant.

Squib — An electrically fired igniter.

Stamping — The process of filling up holes with sand, clay, soil, etc, after they have been charged with explosive.

Star — A pyrotechnic light signal of short duration (but not a flash) that burn as a speck of light in the air.

Steady State Velocity — Steady velocity attained by an explosive charge after an initial peak pressure.

Stray Currents — The leakage currents from the electrically operated equipment, current conductors, etc, that may energize the electric shot-firing circuit resulting in accidental detonation.

Strength — *See ' Power ', ' Weight strength '.*

Streaming Velocity — The velocity of the products of detonation in the direction of travel of the detonation wave.

Sympathetic Detonation — Detonation of an explosive charge caused by explosion of another charge not in contact.

T

Tamping — The act of consolidating explosives or stemming in the drill hole.

TNT — Trinitrotoluene.

Toe Blasting — A technique of blasting to avoid toe formation in bench blasting.

Torpedo Friction Test — *See ' Friction test '.*

Train — *see ' Delay '.*

Trauzl Test — *See ' Lead block test '.*

Trunk Line — The main line of detonating fuse to which branch lines are connected.

Two-component Explosive — Generally refers to an explosive obtained by mixing two components, where neither of the two components is an explosive by itself (also known as ' Binary Explosives ').

U

Under-Cut — *See under ' Cut '.*

Underwater Blasting — Blasting of explosive under water.

V

Vacuum Stability — Test for determination of stability of explosives. In this test, the thermal decomposition of a sample is followed by observing the rise in pressure of the gases given off in vacuum.

Verey Pistol — A popular but obsolete term for a pistol shaped firing device for pyrotechnic cartridges, now called ' Pyrotechnic pistol '.

VOD — Velocity of detonation (*See ' Detonation velocity '.*).

W

Watergel Explosives — *see ' Slurry explosives '.*

Water Stemming — Stemming done using water column in a bore-hole.

Wedge-Cut — *See under ' Cut '.*

Weight Strength — *See ' Power of explosives '.*